

NORTH DEVON UNESCO BIOSPHERE RESERVE

NATURE RECOVERY PLAN, 2021-25

OUR CONTRIBUTION TO TACKLING THE GLOBAL ECOLOGICAL EMERGENCY

ACTION PLAN FOR WETLANDS AND WATERBODIES



VISION FOR NATURE IN WETLANDS AND WATERBODIES BY 2030

By 2030, nature in our wetlands and waterbodies is recovering. Re-naturalised floodplain and other riparian land provides a mosaic of habitats for wildlife and creates opportunities for dynamic rivers and streams. Wide corridors of scrub, floodplain meadow and woodland alongside watercourses act as buffer strips from pollution and connect previously fragmented habitats. Habitat restoration (including on the degraded blanket bogs of Exmoor and Dartmoor) and creation have increased landscape connectivity and natural river flows. Water quality has improved with fewer sources of diffuse and point pollution. Barriers to fish movement and migration have been removed, large woody debris and clean spawning gravels are widespread: salmon are recovering. Beavers have colonised all catchments, creating nature-rich and climate resilient habitats. Expanding networks of Culm grassland support thriving (meta)populations of marsh fritillary butterflies and narrow-bordered bee hawk-moths. The drumming of snipe and cries of breeding lapwing and curlew are heard once more, and willow tits sing in wet woodlands. Non-native invasive species now have minimal impact. Altogether, catchments support abundant and increasing wildlife ranging from aquatic plants and invertebrates to eels and freshwater pearl mussels.

Please read this plan in conjunction with the Introduction / Overview chapter

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PART I: SCOPE AND MAP OF THE HABITATS COVERED BY THIS ACTION PLAN

This plan covers:

Rivers and streams: These include the entire river systems of both the Taw (from its headwaters on Dartmoor and SW Exmoor) and the Torridge (from its headwaters between Hartland and Woolsery and on Dartmoor), including all the tributaries and the streams that flow into them throughout their catchments. It also includes the streams and rivers running directly to the sea from Hartland to Lynmouth (Welcombe stream, Hartland stream, Abbey River, Bideford Yeo, Barnstaple Yeo, Bradiford water, Caen, UMBER, Heddon, West Lyn and East

Lyn). It addresses nature in the river/stream channel, the banks and the riparian zone. The plan considers these rivers and streams (and their floodplains) down to the zone of tidal influence.

Riverine floodplains: These are small and narrow in the upper/steeper sections of the rivers (and throughout the coastal streams) but become larger and much wider in the middle and lower reaches of the main rivers. The larger floodplains are often farmed to within a few metres of the bank.

Reservoirs and farm ponds: There are several small reservoirs and artificial lakes scattered throughout the Biosphere area, the main ones being Wistlandpound, Meldon Reservoir and Meeth Quarry. Many farms and landholdings already have ponds with a minimum estimate of at least 1,000 in the Biosphere. These are often neglected or not designed for optimum wildlife value.

Wet woodland: Wet woodland is frequent throughout the Biosphere reserve in places with impeded drainage and in valley bottoms. Such woodlands are often associated with Culm grasslands and occasionally with riverine floodplains.

Purple moor grass and rush pastures (Culm grasslands): These are widespread on heavy clay soils throughout the Biosphere, the reserve holding a significant proportion of the national resource of this habitat type. Sites are fragmented and often neglected or under inappropriate management. A few of these areas are protected as SSSIs or SACs, but most are unprotected.

Upland blanket bogs, mires and wet heaths of Dartmoor: These lie in the highest parts of the catchments within the Biosphere boundary and the Dartmoor National Park. These habitats are of high nature conservation value and support downstream ecosystems in the Biosphere through their water regulation functions. (NB. The dry heaths of Exmoor are covered in the Coast action plan).

MAP OF THE HABITATS COVERED BY THIS ACTION PLAN

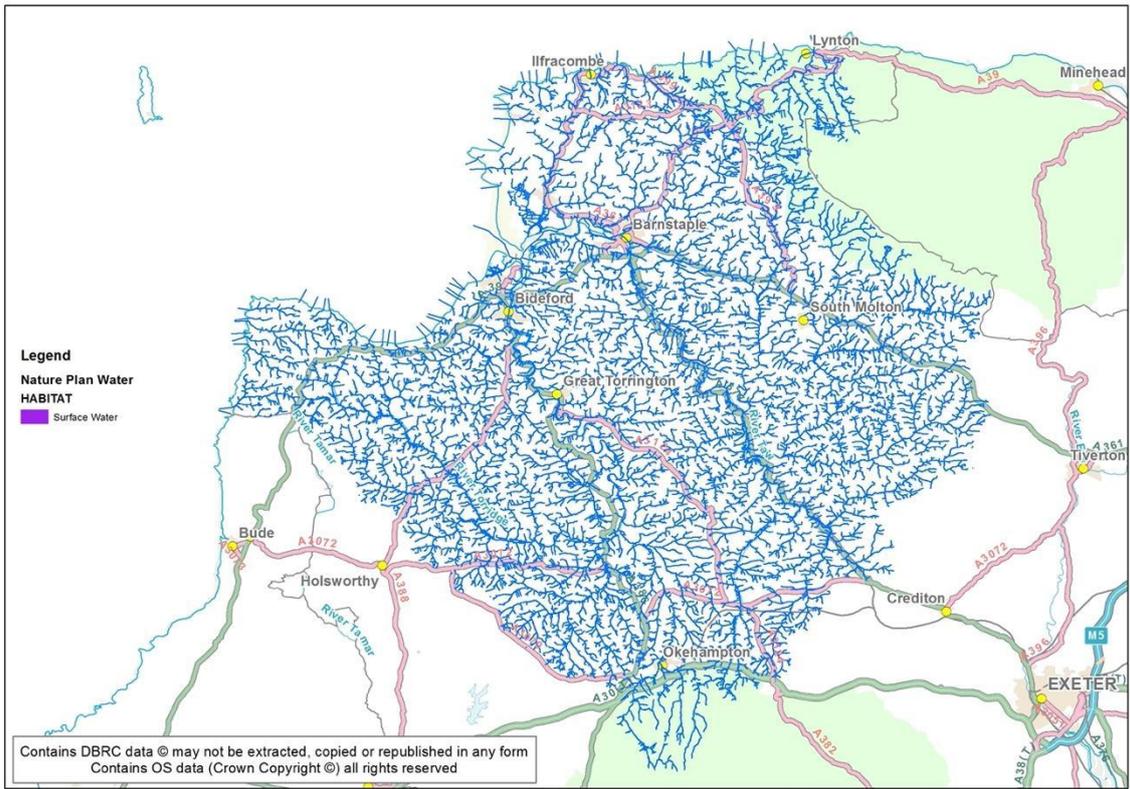


Figure 1: Map of details rivers network in Biosphere

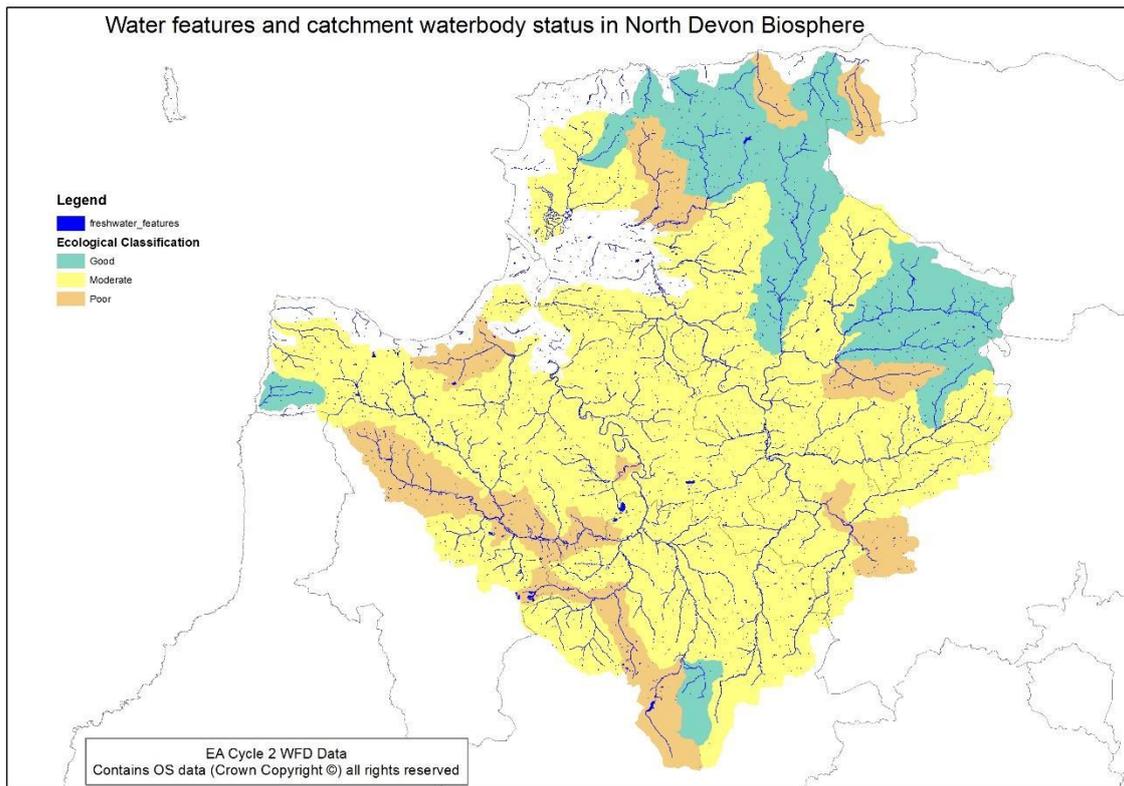


Figure 2: Water features and catchment waterbody ecological status in the North Devon Biosphere

For specific targeting opportunities, please also refer to the Nature Recovery Network maps for Devon, expected to be published by the Devon Local Nature Partnership during 2021.

PART II: PRIORITY ACTIONS FOR NATURE’S RECOVERY IN WETLANDS AND WATERBODIES

The following actions have been identified as priorities for the period 2021-25 to progress towards the 2030 Vision and overall Goals of the Biosphere Nature Recovery Plan. The lead partner for each action (shown in bold) will actively engage with the other partners to drive implementation and report on progress. In general, resources for the actions are not yet secured and the partners will examine ways to integrate the action into their own programmes, as well as seeking new resources (and partners) where necessary. Therefore, being listed as a lead or partner organisation does not imply a commitment of new resources but does confirm support for collaborating to deliver the ambition and principles of the actions. Partners will work with and support farmers and landowners to deliver this action plan, using the incentives of the existing Countryside Stewardship scheme, the new Environmental Land Management scheme, green finance and other projects.

These actions have been developed following a careful, fresh examination of the state of nature in the Biosphere and of the underlying reasons for decline and loss, focussing on the current, on-going, factors which are driving nature’s decline. See Part III below for details.

Much good work has been done over the last decade and this is also outlined in Part III, along with issues that are shared between this and the other four plans.

Habitat-related actions	Lead / Partners	Budget source	By when
A1. Further improve 100 km of prioritised river spawning habitat to increase fish recruitment by removing or making passable at least 5 prioritised barriers to migration.	WRT , DWT, EA, Fishing Assoc., NT, Landowners	EA	2025
A2. Further improve 100 km of prioritised river spawning habitat to increase fish recruitment by ensuring adequate habitat type, through woody debris introduction and gravel augmentation / cleaning.	WRT , DWT, EA, Fishing Assoc., NT landowners	EA	2025
A3. Restore and re-naturalise 200 ha of riverine floodplain to create wildlife-rich mosaics of wetlands, scrub and wet woodlands by re-establishing hydrological connections, creating scrapes and pools, and allowing natural processes to re-establish.	WRT , DWT, EA, Fishing Assoc., NT, FC, Landowners	EA, CSS / ELMs, green finance, private investment	2025
A4. Establish buffer strips of at least 4m width along 50km of prioritised river and stream wildlife corridors (= 20 ha) including both passive and active management enabling natural regeneration, tree planting and management and bank protection, recognising that unshaded and unstable riverbanks can also be very important habitats for invertebrates as well as breeding sand martins.	WRT , DWT, EA, NE (CSF), Fishing Assoc., NT, FC, Landowners	EA, CSS / ELMs, green finance, private investment	2025
A5. Create 15 ha of wet woodland and associated wetland habitat (excluding species-rich wet grassland), ensuring that existing wet woodlands are managed appropriately and in favourable or improving condition.	WRT , DWT, EA, Fishing Assoc., NT, FC, Landowners	EA, CSS / ELMs, green finance, private investment	2025
A6. Create 200 ha of new species-rich wet grassland as well as protect and restore existing areas.	DWT , NT, Landowners	EA, green Finance, DCC (Flood risk), CSS / ELMs, private investment	2025
A7. Create or restore 100 ponds, scrapes, reed/sedge beds to create wildlife habitat as well as manage run-off.	DWT , WRT NT, EA, NE, Landowners	CSS / ELMS, Green Finance, EA & DCC, private investment	2025
A8. Buffer the rivers from road and urban run-off and ensure clean water is separated from combined sewerage systems including septic tanks and rural sewage systems leading to a 50% reduction in the number of Combined Sewer Overflow spills.	DCC , SWW	DCC and District Councils	2025
A9. Engage landowners in re-naturalising/wilding 100 ha of species poor habitat on the Taw and Torridge headwaters, to restore a mosaic of culm grassland, wet woodland and other wetland habitats through natural processes.	DWT , EA, NT Landowners	CSS / ELMs, green Finance, private investment	2025

A10. Restore 226 ha of Dartmoor's blanket bog: 176 ha on the upper catchment of the Okement (including the Cranmere Pool area), plus 54 ha on the upper catchment of the Taw (including part of the Hangingstone project area).	Dartmoor National Park Authority , SW Peatland Partnership, Landowners	CSS / ELMs	2030
A11. Continue restoration of 280 ha of Exmoor's degraded blanket bog to enhance the resilience of Exmoor moorland for ecological and ecosystem service gains.	Exmoor National Park Authority and partners, Landowners	CSS / ELMs	2030
A12. Reduce the occurrence of point source and diffuse pollution. Category 1 pollution incidents reduced by 50% from 9 (2010-19) to 4 or less (2020-29). Category 2 and 3 pollution incidents reduced by 50%. Increased proactive targeted Silage, Slurry and Agricultural Fuel Oil (SSAFO) and Farming Rules for Water compliance checks completed.	EA, NE (CSF) , Landowners & Businesses	EA	2030
A13. Designate 50 new Wetland habitat County Wildlife Sites, increasing awareness and protection of these invaluable resources	DBRC	DCC/DWT & external funding sources	2030
Species-related actions	Lead / Partners	Budget source	By when
B1. Complete feasibility study by 2023 and start implementation of freshwater pearl mussel reintroduction programme with suitable headwater habitat created on the Torridge; establish a captive breeding hatchery and ark population; achieve two rounds of FPM captive breeding.	DWT, EA	EA, Private funding, Research funding	2025
B2. Work with affected stakeholders via the catchment partnership in north Devon to understand, prepare for and mitigate any potential problems arising from beaver and vole reintroduction and set up a management programme between beneficiaries and those impacted to allow reintroduction of beavers and water vole in the Biosphere river systems, making use of opportunity areas where there is landowner support.	DWT, Beaver Trust, NT, Landowners	Grants, green finance, private investment	2025
B3. Control and if possible eradicate, non-native invasive plants including Himalayan balsam over 50km of river in the Taw and Torridge headwaters according to a clearly prioritised strategy (see enabling actions).	DWT, WRT, NT, Fishing Assns., Landowners, ENNIS	Volunteers, private investment, EA	2025
B4. Engage with user groups to raise awareness and promote biosecurity and control measures to prevent further spread of current population of signal crayfish in the Torridge.	EA, WRT, Fishing Assns. Landowners	EA	2025
B5. Promote voluntary 100% catch and release fishing on rivers with fishing clubs and associations through voluntary sign up	EA, WRT, Fishing Assns.	N/A	2025
B6. Improve habitat connectivity and reintroductions to allow meta-populations of marsh fritillary and narrow bordered bee-hawkmoth to extend in distribution with populations stable and increasing.	Butterfly Conservation, DWT	Grants, CSS / ELMs, private investment	2025

B7. Provide 200 nest boxes for willow tits in 20 wet woodland sites lacking suitable natural nesting sites and monitor success and predation. This could include creating standing deadwood as alternative nesting sites.	Devon Birds, Biosphere team DWT, NT, Landowners	CSS /ELMS private investment	2025
Enabling actions	Lead / Partners	Budget source	By when
C1. Secure new funding sources for the restoration of river and stream corridors where nature conservation is given priority through top-up / challenge funds to ELMS.	Biosphere team, WRT, NT	EA, Green Finance, Water companies,	2025
C2. Increase advisory capacity by five posts to allow farmers to take re-naturalised/rewilding options including information on managing appropriate grazing and water levels, invasive species etc. Including training <u>existing</u> Countryside Stewardship advisers/land agents.	DWT, WRT, Biosphere	Statutory agencies	2025
C3. Prepare a prioritised framework for addressing threats from non-native invasive species and adopt best practices for their management in close collaboration with DISI and the ENNIS project.	NIWG, DISI, ENNIS	£2000 Student project	2022
C4. Double public participation, education and awareness through the facilitation of citizen science monitoring of the rivers (e.g. river fly, citizen science, eyes on the river) and coordination (e.g. catchment hub). Contribute to advocacy for better standards for bathing water quality standards.	Biosphere team, WRT	EA	2025
C5. Increase awareness of pollution and Farming Rules for Water and guidance on when Incident Hotline should be used so that all farmers are aware. Education campaign with farmers and the general public regarding the Farming Rules for Water and Storing silage, slurry and agricultural fuel oil (SSAFO) regulations.	Biosphere team, WRT, DWT, EA	EA	2025
C6. Encourage all fishing clubs and riparian owners to have a nature recovery plan for their section of river, including habitat restoration, juvenile fish recruitment and wider nature values.	Biosphere team, Fishing Assns., Beat Owners	EA	2025
C7. Promote the Obstacle app and increased reporting of any barriers to species migration.	WRT	N/A	2025
C8. Raise awareness of the importance of wet woodlands and Culm grassland for nature and provide guidance on appropriate management.	Biosphere team, DWT	FC	2025
Monitoring Priorities	Lead / Partners	Budget source	Frequency
M1. Third party active nutrient monitoring in river upstream and downstream of all sewage treatment works pre-empting future freshwater bathing waters designations (linked to water company discharge assessments).	WRT	?	Continuous
M2. Salmon Fry Index Surveys in all catchments for complete overview linked to indicator assessment.	WRT	Partnership projects	Annual
M3. Evaluate water quality of Taw/Torridge and north Devon streams through citizen science water quality assessments	WRT, EA, Biosphere team, AONB, Coastwise	?, volunteers	Multiple

M4. Citizen science programmes for monitoring the indicator species mentioned above	Biosphere team, expert groups	Volunteers	Dependent on species
M5. Monitor the condition of Wetland County Wildlife Sites	DBRC	DCC/DWT & LPAs	Annual
Research Priorities	Lead / Partners	Budget source	Frequency
R1. Sustain and increase the survey effort for marsh fritillary and narrow-bordered bee hawk-moth on Culm Grassland	DWT/BCT	?	?

INDICATORS

These three outcome indicators will be monitored to track the overall impact of plan implementation.

Indicator	Baseline 2020	Target 2030	Means of verification	Responsible for monitoring
Salmon populations	WRT Salmon fry data Declining numbers	Increasing numbers	WRT & EA electrofishing	WRT & EA
Number of water bodies at good ecological status	15	30	EA WFD monitoring where available and/or WRT Citizen Science work	EA
Area of new wetland habitats created and restored (river corridor, floodplains, wet woodland and culm grassland)	0 ha	<ul style="list-style-type: none"> - Wet woodland creation: 5 ha - Wet woodland enhancement: 15 ha - Restored floodplain: 200 ha - Purple moor grass & rush pasture enhancement: 200 ha - Restored blanket bog: 506ha - Watercourse enhancement (leaky dams, stage 0, etc): 13.5 km - New ponds / seasonally wet scrapes: 150 - Additional 100ha of developing wetland habitat from current pasture land (mix of developing rush pasture, wet woodland) 	Project reports, GIS layers, Agri-scheme maps	DWT & DBRC

PART III: SUPPORTING INFORMATION

IMPORTANCE FOR NATURE

RIVER, STREAMS AND FLOODPLAINS

Mammal species present include otter (occurs throughout the river systems of the Biosphere), bats (particularly Daubenton's) and water shrew; historically beavers were present and reintroduction programmes have started elsewhere in Devon. Additionally, these habitats are important for the re-colonisation of recently lost species such as water vole, facilitated by the management of mink populations. Birds include goosander, grey heron, dipper, grey wagtail, kingfisher, common sandpiper and sand martin. Fishes include Atlantic salmon, sea/brown trout, lamprey, bullhead and eel. Historically sturgeon and shad were present. A huge diversity of insects is associated with riverine habitats including white-legged dragonfly, beautiful demoiselle and numerous beetles and flies. The Taw and Torridge hold small (and non-breeding) populations of the freshwater pearl mussel, being the only remaining rivers in southern England to support this IUCN Red Listed "Critically Endangered" species (also a Devon Special Species). The Torridge holds an estimated population of fewer than 1,000, and the river Mole (Taw tributary) fewer than 100 mussels, with occasional individuals found elsewhere. No mussels in north Devon are thought to be younger than about 60 years old, and there is no known recruitment, although two rounds of captive breeding were completed in 2017/18. Amphibians and reptiles include common frog, toad and great crested newt. Mosses and liverworts including the UK BAP and Devon Special Species multi-fruited river moss.

RESERVOIRS AND PONDS

Reservoirs are highly modified due to abstraction of water (causing fluctuating water levels), impoundment of once-flowing rivers, interruption of natural conveyance, and the introduction of fish, but can support important waterbird populations such as ducks, great-crested grebe and visiting ospreys, with valuable bankside vegetation for a diversity of wildlife. Ponds can be rich in wildlife including otters, grey heron, kingfisher, moorhen, common frog and toad, dragonflies and damselflies, water beetles and a diversity of aquatic plants. These still water bodies provide important habitat diversity and can act as attenuation or filtration to improve surface water quality.

WET WOODLANDS

Characterised by alder and grey willow, sometimes together with downy birch. Ground flora includes various sedges, marsh marigold and occasional patches of bog mosses. The habitat supports huge numbers of insects such as craneflies and fungus gnats along with many nationally scarce or threatened invertebrates such as the fly *Coenosia pudorosa*, a Devon Special Species, and the beetle *Epuraea distincta*. Among the birds, the willow tit, nationally a rapidly declining and much threatened bird and a Devon Special Species, is a speciality. Rich and diverse moss and liverwort floras are frequent, together with lichen communities characterised by *Lobaria* and *Sticta* species. Hazel gloves fungus, another Devon Special Species, frequents damp woodland, especially alongside watercourses. Wet woodland is included within Section 41 list of Habitats of Principal Importance of the NERC Act (2006) and as such is recognised as a priority habitat for conservation effort.

PURPLE MOOR GRASS AND RUSH PASTURES

Culm grassland is a type of species-rich marshy grassland found across the Culm Measures of northwest Devon and northeast Cornwall. It occurs on poorly-drained acidic soils on the lowlands and upland fringe and is also known as rhôs pasture. Culm grassland is a variable habitat, including the priority (Section 41) habitat purple moor grass and rush pasture. Devon contains 80% of this habitat in England, and 8% of that in the whole of the UK. It supports some of Devon’s most threatened species such as the marsh fritillary (not present on Dartmoor), small pearl-bordered fritillary, narrow-bordered bee hawk-moth, curlew, snipe and barn owl. The very rare and highly threatened dingy mocha moth is associated with scattered scrub on one, maybe more, Culm grassland sites. Likewise, the Vulnerable (to UK extinction) hoverfly *Sphaerophoria potentillae* has two out of three known UK sites on Culm Grasslands in the Biosphere. This is a Devon Special Species, as are the marsh fritillary and narrow-bordered bee hawk-moth.

BLANKET BOGS, UPLAND MIRES AND FLUSHES AND UPLAND HEATHLAND

The River Taw and two of the Torridge’s major tributaries, the East Okement and the West Okement, arise on the blanket bog of Dartmoor, a mantle of thick peat. This is the most southerly blanket bog in Europe. It forms part of the Dartmoor Special Area of Conservation, and as such is recognised as being of international importance. The valleys running down from the blanket bog contain extensive mires and flushes that are unparalleled in upland Britain, supporting plant communities rarely found elsewhere and of exceptionally fine structure and species composition. The blanket bog, mires and flushes found within that part of Dartmoor which lies within the Biosphere Reserve are no exception to this – all are of high quality. They support a small but apparently stable population of breeding dunlin - the most southerly in the world, while the golden plover which used to breed here have been lost in recent years. A few valley mires in the Biosphere have populations of bog orchid, a species that is threatened throughout Europe. These mires also support rich plant communities with species like sundews and pale butterwort, dragonflies like the keeled skimmer, and healthy numbers of breeding snipe. The rivers themselves are acidic and fast-flowing, often characterised by moss-covered boulders. Here dipper and grey wagtail are frequent, fern communities are luxuriant, including royal fern, and brown trout often common. The bogs, mires and flushes of Dartmoor are typically found in an intricate mosaic with upland wet heathland and acidic grassland that also support the declining ring ouzel (likely to become extinct as a breeding bird of Dartmoor). That part of Exmoor which falls within the Biosphere also has blanket bog and mires, although in smaller amounts and of lower quality. These feed two major tributaries of the Taw, the Rivers Bray and Mole, and the West Lyn and East Lyn. Snipe, grey wagtail and dipper are frequent here too. Cornish moneywort is a plant of particular note associated with the valley mires.

BASELINE AND CONDITION / TRENDS (PARTICULARLY SINCE 2010)

Habitat	Baseline Area (ha)*	Trend** QUANT	Trend** QUALT	Comments (e.g. main reasons and sources of information)
Rivers and streams	67 ha (est. as length x 3.5m average width)	Stable	Decline	Ecological status classified under WFD has declined from 18 water bodies with good ecological status in 2016 to 15 in 2019. Area of river is not typically used but rather length – Taw: 74km & Torridge 93km.

Floodplain grazing marsh	6,452 ha (see Annex 3 of Intro.)	Stable Poor condition	Decline	Estimate in NE Analysis (coastal and riverine). Wider floodplains are mainly under intensive agriculture.
Lakes, reservoirs and ponds	943 ha (see Annex 3 of Intro.)	Not known	Not known	Surface water status under WFD reflected in figures above. Meeth Quarry nature reserve. Biosphere data. Magic.
Wet woodland	2,447 ha (see Annex 3 of Intro.)	Not known	Probably declining	While on the one hand this habitat is in places expanding as willow colonises fields that have come out of production, in others long-established sites are being degraded by drainage, mismanagement or even clearance. It suffers through lack of recognition and awareness of its value for nature within forestry, nature conservation and farming sectors.
Purple moor grass and rush pastures	16,222ha (see Annex 3 of Intro.)	Declining (see Annex 2)	Probably declining	Baseline estimate is probably too high. Vulnerable to damage or destruction through neglect (lack of grazing, overgrazing, scrubbing up, poorly sited tree planting & over management) – see below.
Blanket bog & Peatlands	4,094 ha (see Annex 3 of Intro. and info. provided by the NPAs to the right)	Improving (where under restoration); otherwise stable or declining	Exmoor moorland mosaic: 2,300ha in unfavourable recovering condition and 300ha in unfavourable no change. Peatlands: 700ha of which 280ha is under restoration. Dartmoor: 1,155 ha of blanket bog of which 24 ha is being restored.	See National Park management plans. 90% of this areas is notified as SSSI or CWS ENPA and DNPA and partners are seeking to enhance the resilience of moorland with particular focus on restoring degraded blanket bog for ecological and ecosystem service gains.
Lowland fens	4,234 ha (see Annex 3 of Intro.)	?	?	Includes Reedbeds. Highly improbable there is so much lowland fen in the Biosphere.
Upland flushes, fens and swamps	162 ha (see Annex 3 of Intro.)	?n	?	See National Park management plans
Upland wet heathland (Dartmoor)	1,044 ha	?	?	93% of this areas is notified as SSSI or CWS

	(see Annex 3 of Intro.)			
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*For baseline areas refer to Annex 3 in the Introduction regarding confidence assessments

** Trend estimates from expert opinion unless otherwise evidenced

Indicator Species	Trend QUANT	Comments (e.g. main reasons and sources of information)
<u>Mammals</u>		
Otter	Increasing	Reflects legal protection and cessation of persecution.
<u>Birds</u>		
Willow tit (for wet woodland)	Rapidly declining	Devon Bird Atlas
Dipper (for rivers & streams)	Declining	Devon Bird Atlas
Kingfisher (for rivers streams and ponds)	Declining	Devon Bird Atlas
Dunlin (Breeding, Dartmoor blanket bogs)	Stable	Dartmoor Delivery Plan for Dunlin
<u>Reptiles</u>		
Grass snake	?	
<u>Amphibians</u>		
Toad	?	
Great crested newt	?	
<u>Fish</u>		
Atlantic salmon	Declining from low baseline	Categorised by EA as 'At Risk' on the Torridge and 'Probably at Risk' on the Taw and Lyn (2019). Fry Index Surveys exist for the Taw and Torridge in some years and can be used as a baseline for the young-of-the-year salmon and trout. Evidence of recruitment is an excellent indicator of river health and should be performed annually.
<u>Invertebrates</u>		
Freshwater pearl mussel	Declining	Critically endangered, not breeding
Devon carpet moth	Stable	
Narrow-bordered bee hawk-moth	Declining	
Marsh fritillary	?	
Wood white	?	
<u>Higher Plants</u>		
Wavy St John's-wort	Stable	

Lesser Butterfly orchid Ragged robin	Declining Stable	May be increasing, reflecting re-introduction of cattle to many Culm grassland sites. Has apparently been lost recently from many Culm grasslands. Could be useful for citizen science.
<u>Lower Plants</u> Multi-fruited Cryphaea moss	Stable	Occurs on the Torridge (near Beaford Bridge) and Taw (near Umberleigh); and has recently (2019) been found beside the River Mole (near Arshaton Wood).
<u>Fungi and lichens</u> Hazel gloves fungus Lungwort lichens	Increasing Declining	Increase in records may just reflect increased recording effort. Sensitive to air pollution.

ROOT CAUSES TO BE ADDRESSED

Root Causes	Solutions
<p><u>Loss of natural riparian habitats and lack of dynamism:</u></p> <p>Rivers are of poor quality and are disconnected from their floodplains, and there is a paucity of riverine wetlands and early successional habitats. Floodplains are intensively farmed, and riparian corridors are often very narrow strips of simple vegetation unable to provide suitable wildlife habitat, act as a buffer from pollution, or slow the flow of water during floods. Loss of floodplain connectivity has increased stream power, depth and incision, changing the geomorphology of the river.</p>	<ul style="list-style-type: none"> ● Encourage/incentivise landowners to provide wide corridors/buffers for rivers and streams. ● Encourage/incentivise landowners to restore floodplains. ● Conserve, create and restore species-rich habitats in these areas. ● Identify floodplain sites where natural processes can rewild the area.
<p><u>Loss of in-river habitat:</u> Historic activities which included removing woody debris, dredging and straightening watercourses, and excavating river gravels has left rivers depleted of habitat for nature.</p> <p>Increased fine sediment ingress from bank erosion and run-off restricts the supply of oxygen.</p>	<ul style="list-style-type: none"> ● River restoration work to restore in-river habitat (e.g. removal of hard engineering that impedes natural processes, ceasing practices such as dredging, stone removal and tidying of watercourses that are detrimental to maintaining a healthy river habitat) ● Communication about the importance of these features for rivers/streams. ● Enforcement and tougher penalties for carrying out non-permitted work to watercourses. ● Reduction of sediment pathways through attenuation and filtration.
<p><u>Land use and drainage in the catchments:</u> Conversion/drainage of natural wetland habitats (blanket bogs, mires, wet pastures) as well as woodlands and hedges in the catchments mainly for agriculture, has resulted in changes to the</p>	<ul style="list-style-type: none"> ● Implement natural flood management projects to hold more water in the upper sub-catchments.

<p>speed at which water moves through river catchments affecting riverine wildlife and resilience to flooding and droughts.</p> <p>Culm grassland is vulnerable to damage or destruction through neglect and unfavourable grazing practices, scrub invasion, inappropriate management (drainage, improvement, eutrophication, tree planting and pond creation).</p>	<ul style="list-style-type: none"> ● Allow ecologically depleted land to re-wet and develop into scrub and woodland or be planted with trees. ● Restore hedges in strategic locations to reduce run-off. ● Improve soil management and biodiversity for healthier soils and increased infiltration. ● Raise awareness of the importance of Culm grassland and appropriate management.
<p><u>Climate change</u>: More frequent and severe droughts and floods, and increased summer water temperatures can all negatively affect aquatic wildlife.</p>	<ul style="list-style-type: none"> ● Reduce emissions of GHGs and sequester carbon in blanket bogs and woods. ● Restore the functioning of river and wetland systems to mitigate the impacts of climate change (e.g. reverse drainage works, restore floodplain connectivity). ● Restore riparian corridors of native broadleaved trees to provide shade and keep rivers cool.
<p><u>Barriers in rivers</u>: weirs and other water management structures inhibit the migrations of fish and interrupt natural conveyance. Both upstream and downstream migration are essential to healthy rivers/natural processes.</p>	<ul style="list-style-type: none"> ● Map the spawning habitat and prioritise increased connectivity. ● Locate and assess passability of barriers and remove or provide suitable fish passes or easements where removal is not feasible according to the EA's 5-Point-Approach to salmon recovery. ● Mitigate or reinstate conveyance to improve natural habitat.
<p><u>Non-native Invasive Species</u>: Main species of current concern are Himalayan balsam, Montbretia, Japanese/Himalayan knotweed, Giant hogweed, North American signal crayfish, American skunk cabbage and American mink.</p>	<ul style="list-style-type: none"> ● Map distributions and assess baseline. ● Prioritise and implement management and control with support of landowners and volunteers. ● Improve biosecurity practices and awareness.
<p><u>Loss of keystone species</u>: Loss of ecosystem engineers, most notably beavers, has inhibited natural river corridor dynamics and led to the decline of wetlands and associated flora and fauna. Freshwater pearl mussel populations are endangered and not able to breed. In the past they would have played an important role in water purification.</p>	<ul style="list-style-type: none"> ● Reintroduce beavers and water voles. ● Conserve existing freshwater pearl mussel populations. ● Establish native freshwater pearl mussel hatchery and reintroduction programme to suitable locations.
<p><u>Diffuse pollution</u>: primarily from organic and inorganic fertilisers as well as the input of sediments arising from run-off from poorly managed farmland, but also from accelerated riverbank and bed erosion.</p>	<ul style="list-style-type: none"> ● Apply fertilisers, manures and pesticides according to laws and best practice guidance. ● Reduce nutrient and sediment delivery to water courses by creating riparian buffer strips, creating new hedges along contours, and constructing wetlands to intercept pollutants.

<p>Increasingly powerful pesticides are used in agriculture and runoff or drift delivers them to watercourses.</p>	<ul style="list-style-type: none"> • Ensure farms have the necessary infrastructure and access to loans/grants to improve yards and slurry storage. • Raise awareness of Farming Rules for Water and other legislation. • CSF to provide advice and access to grant funding. • EA to carry out spot-checks and enforce legislation.
<p><u>Point source pollutants</u>: Industry examples from ball clay quarries, anaerobic digestion plants, dairy industry, road runoff. Overflows from septic tanks and inadequate sewage systems can result in severe pollution; endocrine disrupting chemicals from sewage treatment are known to affect fish reproduction.</p>	<ul style="list-style-type: none"> • Monitor for and publicise pollution incidents, enforce laws and prosecute. • Separate clean and dirty water to reduce burden on treatment. • More SUDS schemes to reduce the burden of heavy rainfall on waste-water treatment plants (WWTPs). • Increased use of constructed wetlands and bioremediation. • Greater investment in WWTPs and combined sewer overflows. • Water companies regulated more closely, without the reliance on self-reporting.

BENEFITS / ECOSYSTEM SERVICES

Provisioning services include rivers, streams, reservoirs and ponds as sources of water for domestic, agricultural and industrial use; fish and some edible plants for consumption; timber from bankside trees; and floodplains and Culm grasslands provide grazing for livestock and soils for crops.

Regulating services include (reservoirs and ponds, wet woodlands and Culm grasslands) holding back water in the catchment, buffering high and low water flows in rivers which is important for riverine wildlife and for reducing flood risk for local communities (a particularly important role of floodplains). These wetlands and the rivers themselves also capture sediments and nutrients from poor land management through natural filtration and therefore improve water quality. Riparian habitats play a key role in stabilisation of soil/sediment. Historic importance of freshwater pearl mussel for filtering water.

Facilitating services include primary production, carbon sequestration, nutrient cycling and soil formation.

Cultural services include recreation (angling, hiking, kayaking, birdwatching) and tourism; intellectual and aesthetic appreciation (study, citizen science, research); spiritual and symbolic appreciation (sense of place, the arts and folklore); health and wellbeing. Rivers and wetlands contribute key features to landscape quality and character.

MAIN ACHIEVEMENTS 2010-2020

Since 2012 the Northern Devon Nature Improvement Area (NIA), led by Devon Wildlife Trust with a number of Biosphere partners, has delivered a series of projects working with landowners and communities to improve the water environment. These have included:

- **NIA phase 1 April 2012- March 2015** – 1,500ha habitat restored and 80 ha new habitat created; numerous other farming advisory and community outputs, many of which were related to wetland habitats.
- **NIA phase 2 April 2015 – March 2021** Restoring Freshwater Mussel Rivers in England (2015–18) and follow up work; Torridge Headwaters Facilitation Project (2015-20); Culm Grassland Natural Flood Management Project (2016–21); Torridge River Restoration Project (2019–21). The projects from 2015-20 have together achieved the following: 457 ha Culm grassland restored; 99 ha new species rich wet grassland created and monitored; 73 km of river improved for wildlife and water quality; 1,188 one-to-one advisory visits made to farms by DWT staff; 157 farms made significant practical improvements for wildlife; 118 workshops organised for farmers and landowners; over £1.45M invested in north Devon’s natural environment; 43 volunteer work parties; 4 endangered freshwater pearl mussel populations protected; 2 successful rounds of captive breeding of freshwater pearl mussel; 304 schoolchildren engaged with the natural environment.

Over the past 10 years Westcountry Rivers Trust has worked with the Rivers Taw Fisheries Association and the Environment Agency in a strategic effort to improve fish migration up the main River Taw catchment to Dartmoor and the main sub-catchment, the River Mole, to Exmoor. This has involved barrier removal, nature-like passes, technical fish passes and easements addressing 12 structures. Alongside this in-river work the Trust has also worked with land managers to manage water pollution into the Taw and improve woodland management on farm. Working alongside the above WRT has continued to monitor the catchment and direct restoration and conservation efforts towards areas in response to monitoring: a dynamic and adaptive management process. Funding for the above through WRT over the last 10 years totalled £3.25m. WRT is active across other areas of north Devon, including the River Caen, Knowle Water, Bradiford Water and River Yeo (Barnstaple) that discharge directly to the estuary.

Fishing clubs/associations are increasingly contributing to conservation work through catch and release, and active habitat management (e.g. managing riparian vegetation, controlling Himalayan balsam, improving spawning habitats and monitoring).

Within the Biosphere boundary, Dartmoor National Park has begun restoration of 24ha of blanket bog as part of the Hangingstone project area, and Exmoor National Park has begun restoration over 280 ha of peatlands.

CROSS-CUTTING ISSUES WITH OTHER ACTION PLANS

Pasture and arable: Diffuse agricultural pollution and run-off/sedimentation; maize and soil management as well as enforcement of regulations. Rehabilitation of floodplains and restoration / creation of wetlands, culm grasslands etc.

Towns and villages: Point source pollution from sewage treatment works, industry and domestic septic tanks. Run-off from roads.

Trees, woods and hedges: strategic habitat creation to improve the water environment.

Coast: downstream impacts of water quality and quantity on estuarine wetland habitats including associated flood plains, grazing marshes, fens and saltmarshes.

DRAFTING GROUP FOR THIS ACTION PLAN

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ANNEX 1 RIVER WATER FRAMEWORK DIRECTIVE (WFD) DATA

The 2019 WFD data collected by the Environment Agency shows that none of the 100 water bodies within the North Devon area meet good or high overall status with 82 classified as moderate and 18 as poor. This is a worsening in both ecological status (18 were in good ecological status in 2016 compared to 15 in 2019), and chemical status (all bar one water body passed in 2016 to none passed in 2019). This is due to the inclusion of PBDs (fire retardants) and mercury assessed in fish (new assessment technique). Ecological failures are predominantly on the lowland areas with the good ecological status water bodies mostly confined to the moorland and north coast streams (14 on Exmoor and 1 on Dartmoor). The data suggest that the majority of ecological failures are due to diffuse and point source pollution coming from sewage discharges, poor nutrient management on farmland, poor livestock management and poor soil management. Some waterbodies have barriers to migration causing failing ecological status for fish.

Table 1 Significant Water Management Issues impacting on ecological status

Significant Water Management Issue (SWMI)	No. RNAGs	%
Diffuse source	177	49.58
Point source	135	37.82
Physical modification	17	4.76
Natural	10	2.80
Suspect data	10	2.80
Flow	4	1.12
Other pressures	3	0.84
Invasive non-native species	1	0.28
TOTAL	357	100

ANNEX 2. CULM GRASSLAND DATA

An update of the Culm Grassland Inventory for north Devon in 2016 (DBRC) indicated an increase in Culm grassland from 533 sites to 643 sites but this is complicated as new sites have been identified but sites have also been lost (see Table 2 and 3).

Table 2 Comparison with the previous Culm Grassland Inventory

Culm Inventory	Culm Inventory 2008	Culm Inventory 2016
Number of sites	533	643
Area (ha)	3,863 (includes non-Culm habitat e.g. scrub)	4,950 (total area)* 2,945 (area of Culm)**

* Total area of the site, including any mosaic habitats. **Area of Culm Grassland only

Table 3 Changes to the Culm Grassland Inventory

Culm Inventory	Number	Area (ha)
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New sites identified from survey data	208	944 (total area) 522 (area of Culm)
New areas of Culm identified from survey data	193	794 (total area) 409 (area of Culm)
Sites completely lost	62	190 (total area)
Sites partially lost	147	361 (total area)